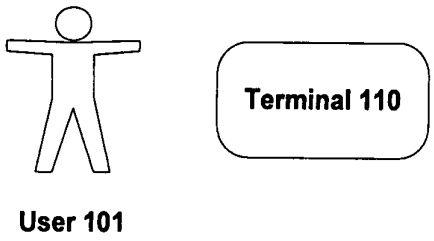

Figure 1A

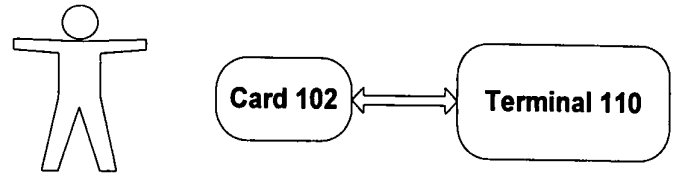

Figure 1B

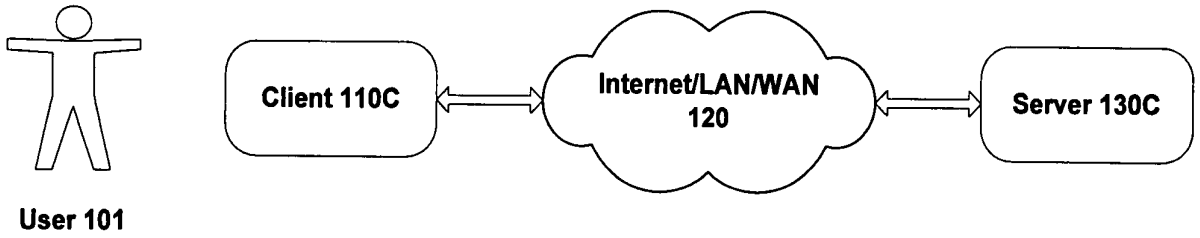

Figure 1C

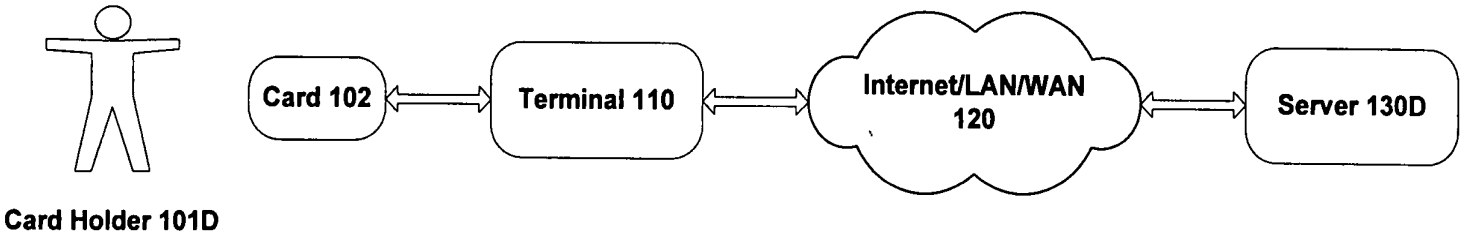

Figure 1D

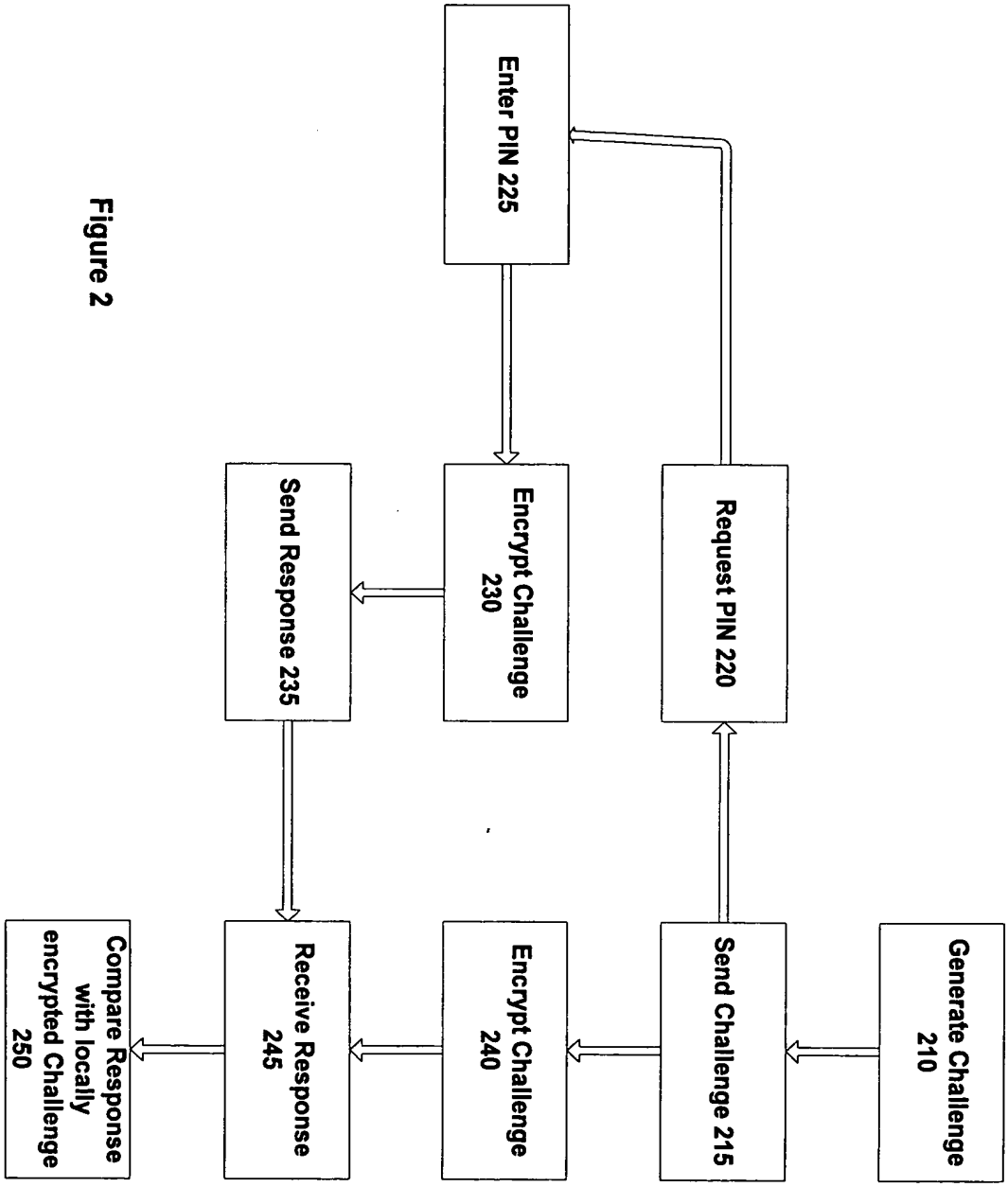
Card Holder 101
Terminal 110
Card 102
Enter PIN 225
Request PIN 220
Encrypt Challenge 230
Send Response 235
Generate Challenge 210
Send Challenge 215
Encrypt Challenge 240
Receive Response 245
Compare Response with locally encrypted Challenge 250

Figure 2

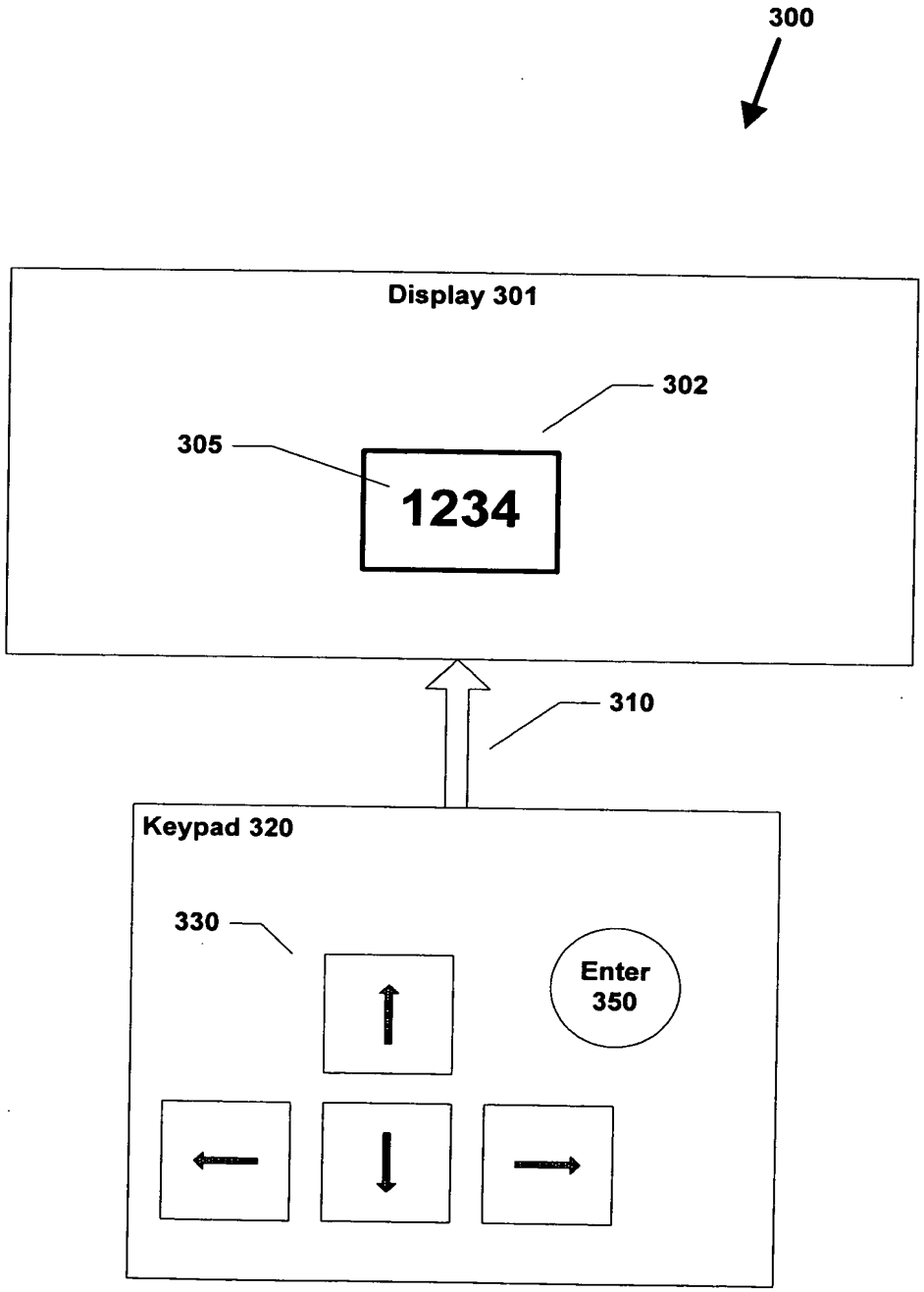

Figure 3

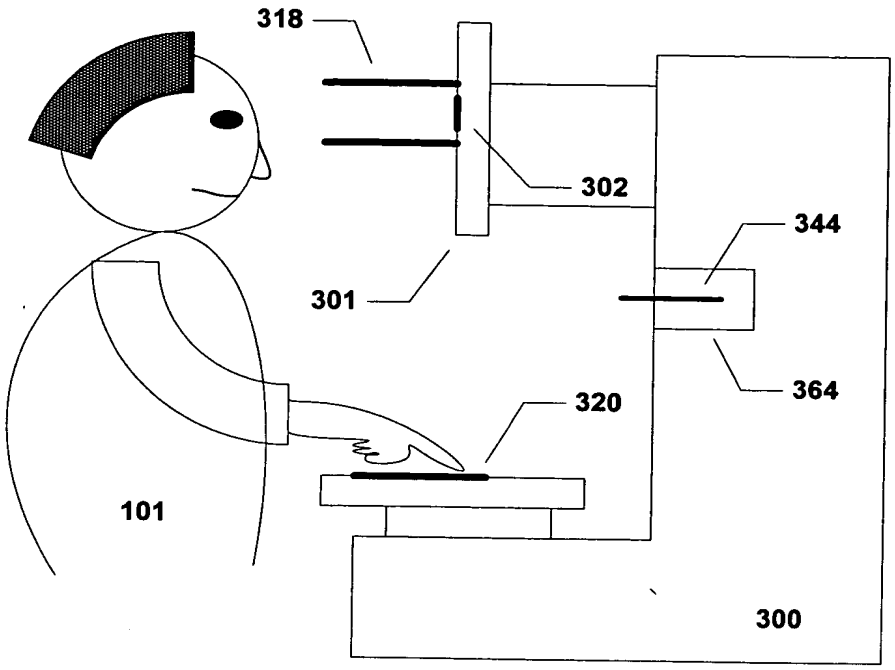

Figure 4

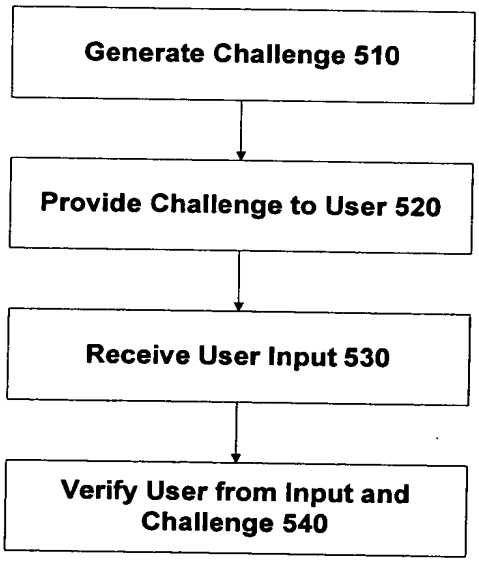

Figure 5

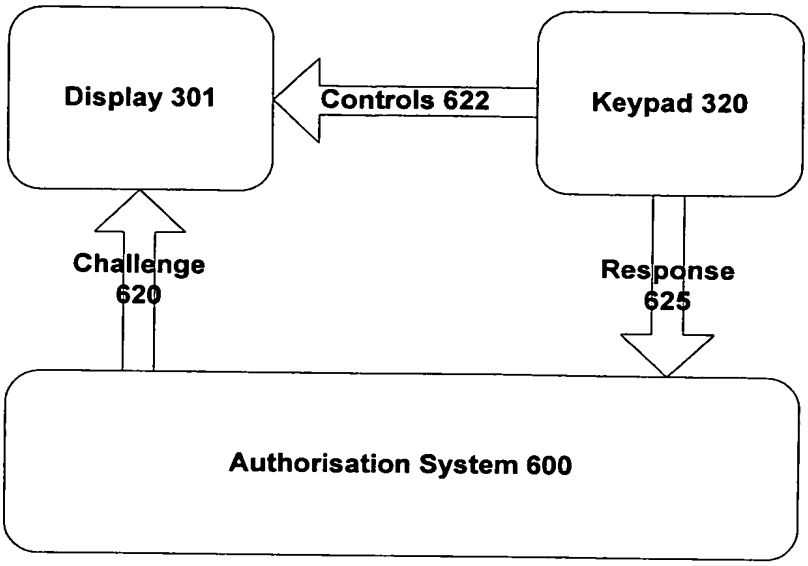

Figure 6

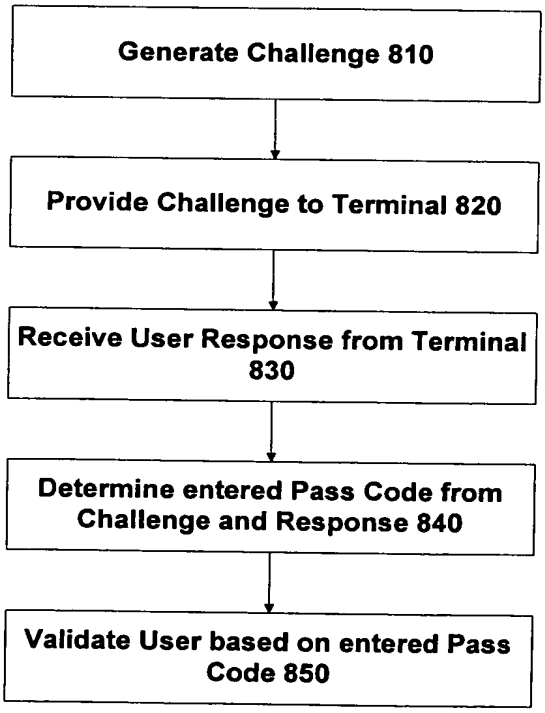

Figure 8

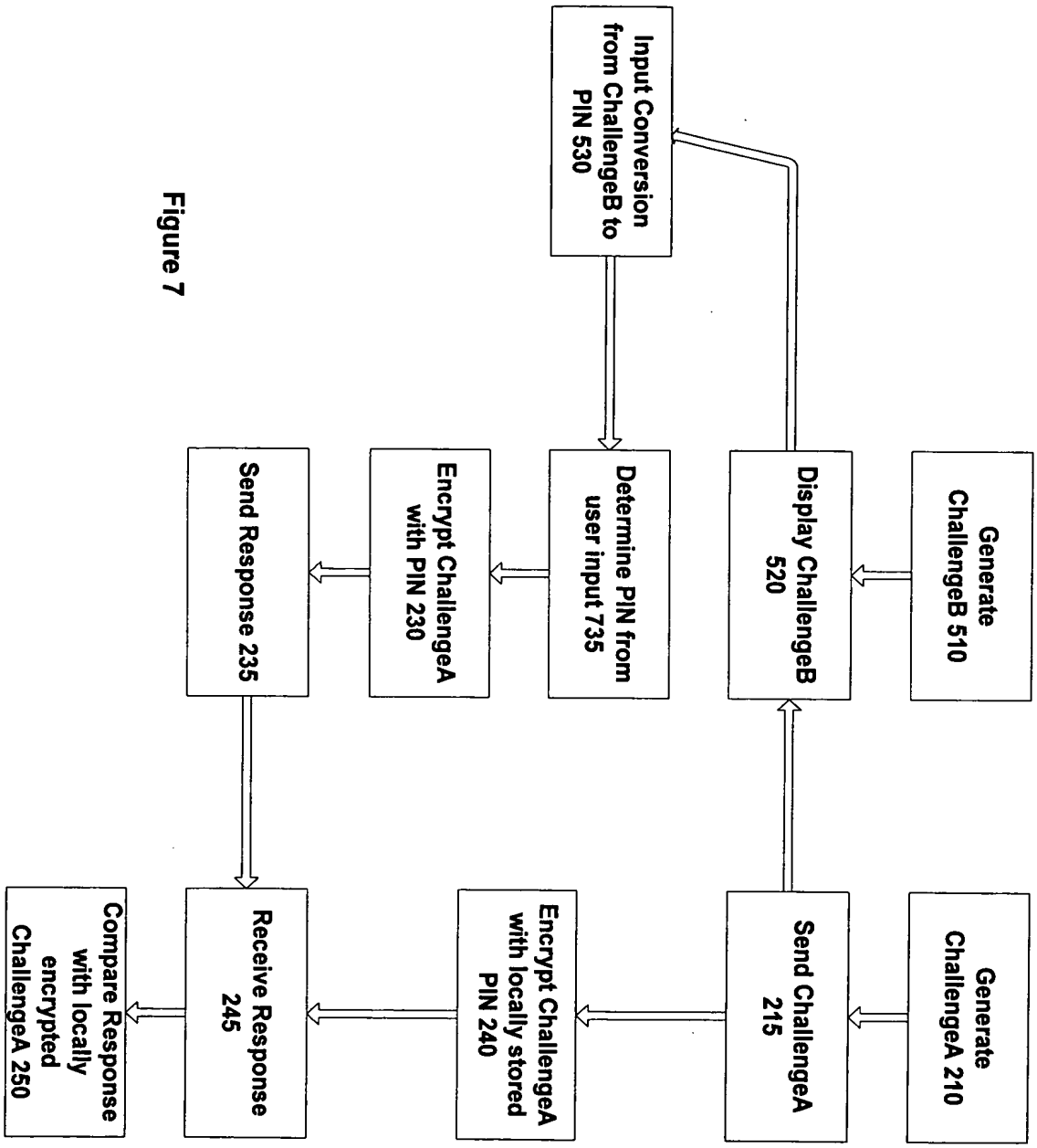
Card Holder 101
Terminal 300
Card 344
Generate ChallengeB 510
Display ChallengeB 520
Input Conversion from ChallengeB to PIN 530
Determine PIN from user input 735
Encrypt ChallengeA with PIN 230
Send Response 235
Generate ChallengeA 210
Send ChallengeA 215
Encrypt ChallengeA with locally stored PIN 240
Receive Response 245
Compare Response with locally encrypted ChallengeA 250

Figure 7